Abstract

The invention provides improvements in reconstructive imaging of the type in which a volume is reconstructed from a series of measured projection images (or other two-dimensional representations) generated by projection of a point x-ray source (or other radiation source), positioned at a distinct focus, through the volume to a plane at which the respective projection image is acquired ("detector plane"). In one aspect, the improvements are with respect to back-projecting a two-dimensional representation lying in the detector plane (representing, for example, a difference between an originally-acquired measured projection image and a subsequently-generated estimate thereof) to generate three-dimensional representation (which can be used, for example, to update an estimate of the volume). According to this aspect, for each of one or more slices of the 3D representation parallel to the projection plane and for each distinct focus at which a projection is generated, the following steps are performed in connection with the back-projection: (i) warping the first 2D representation to generate a second 2D representation by applying to the first 2D representation a selected linear mapping, where that selected linear mapping would map, in order to match dimensions of the respective slice within the 3D representation, a region defined by projection, at the respective focus, of corners of that slice onto the detector plane, and (ii) incrementing values of each of one or more voxels of the respective slice by an amount that is a function of a value of a correspondingly indexed pixel of the second 2D representation. A related aspect provides improvements with respect to forward-projecting, as well as in iterative (and non-iterative) methodologies that incorporate both back-projection and forward-projection.